Instruction Manual

SW404HD | SW808HD
High Definition Matrix Switch



SW404HD Matrix



SW808HD Matrix

Before You Use the System

1. Read manual Carefully read the manual..

2. Installation environment The system should be installed indoors only. Install either in a sturdy rack or on a table in a well-ventilated place.

3. Lightning Unplug the power cord during lightning or after prolonged period of non-use to avoid damage to the equipment.

4. Maintenance Only qualified technical engineers or specified distributors are permitted to repair or replace components and parts of the equipment upon failure.

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Matrix System Overview

Matrix System

The Matrix Switch is a high performance system used to switch audio/video frequencies. It will cross switch multiple input/output audio/video signals through independent Y/Pb/Pr component and audio input/output terminals. Each Y/Pb/Pr component signal and audio signal is transmitted separately and switched separately, thereby minimizing signal attenuation and ensuring high definition graphics and high fidelity audio signal output.

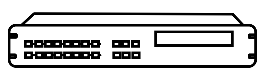
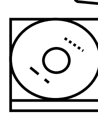
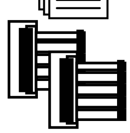
The primary use is; TV broadcasting projects, multi-media conference halls, large display projects, TV teaching, and command control centers. It features power interruption protection during power surge, LCD display, and synchronous and separate audio/video switching functions. The RS-232 and RS-485 communication ports enable convenient communication with remote control equipment. This manual describes the SW404HD and SW808HD models.

Matrix System Models

Model	Technical Parameters					
	Video Input Port	Video Output Port	Audio Input Port	Audio Output Port	RS-485 Connector	RS-232 Connector
SW404HD	4	4	4	4	√	√
SW808HD	8	8	8	8	√	√

Matrix System Packing

When unpacking, ensure the following items are found:

- One SW XXX HD Matrix 
- One RS-232 cable 
- One power cable 
- One testing and application CD 
- One user manual 
- Two green terminals 

Matrix Host Installation

The SW XXX HD Matrix should be placed on a sturdy desk or installed on a 19-in rack.

Matrix System Front/Rear Panels

<u>Model SW404HD Front/Rear Panels</u>



SW404HD Front Panel

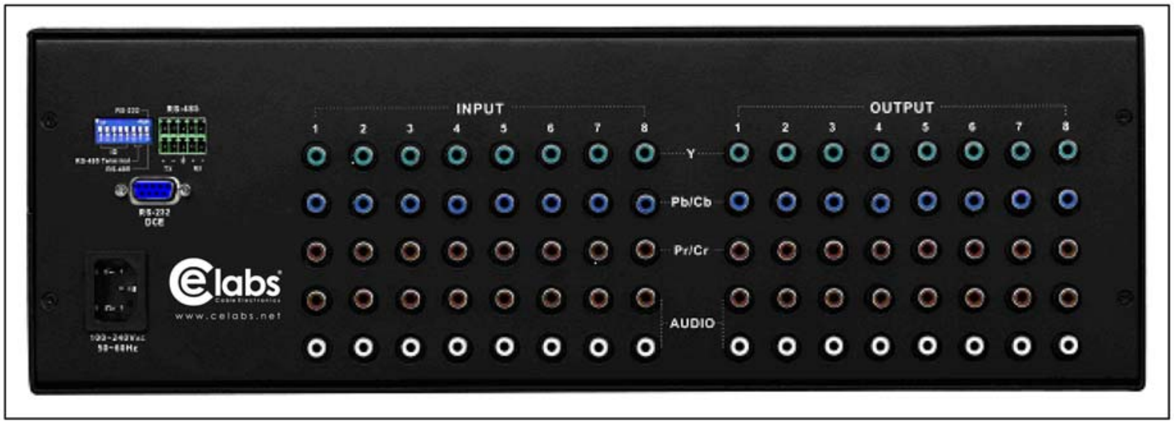


SW404HD Rear Panel

Model SW808HD Front/Rear Panels

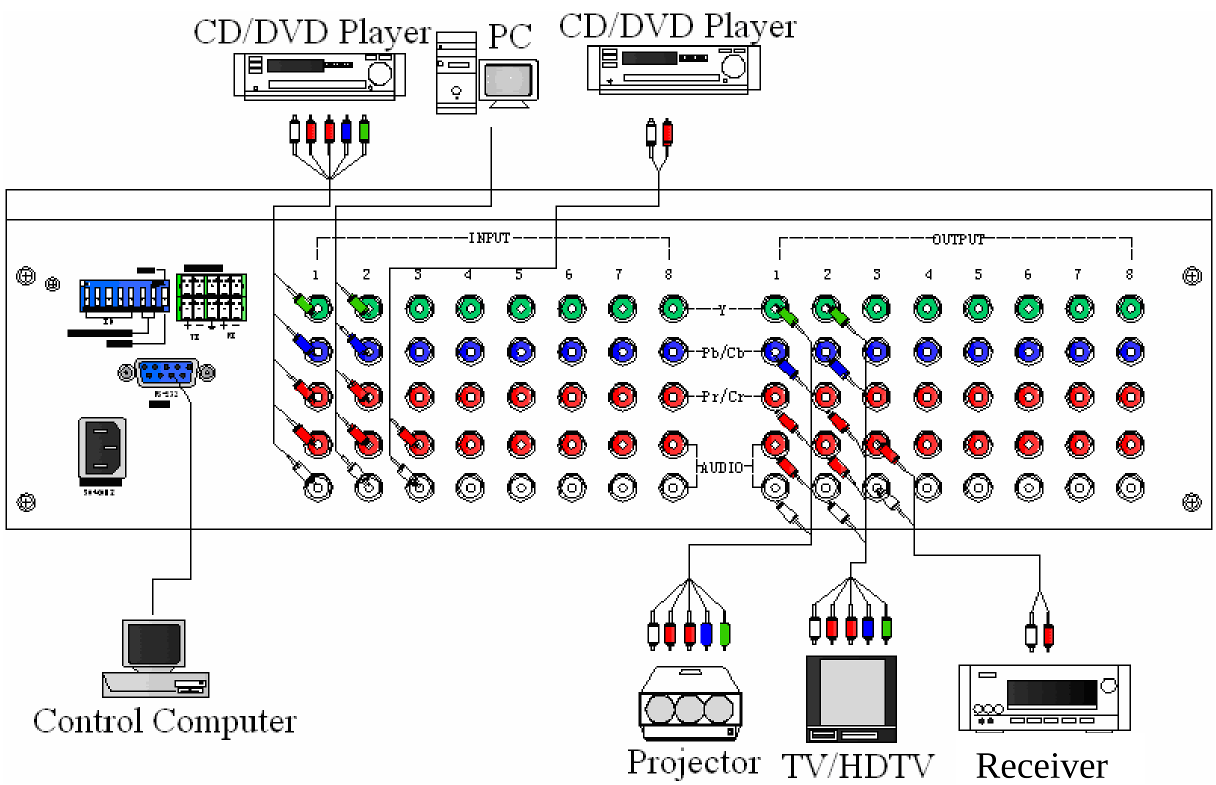


SW808HD Front Panel



SW808HD Rear Panel

Matrix and Peripherals Connection



Matrix System Connections

Input/Output Jacks

Dependent on the matrix model installed, the video signal input/output jacks are arranged in either 4 or 8 columns of RCA female connectors. The connector rows from top to bottom are: Y video (green), Pb/Cb video (blue), Pr/Cr video (red), right audio signal (red), and left audio signal (white). The input and output jack channels are numbered from left to right as 1 to 8 (or 1 to 4). Refer to the drawing above for other types of connectors. The model numbers of the matrix systems describe the number of input/output connectors. **Example:** Model SW404HD has 4 input sets and 4 output sets.

Connecting Audio/Video Cable

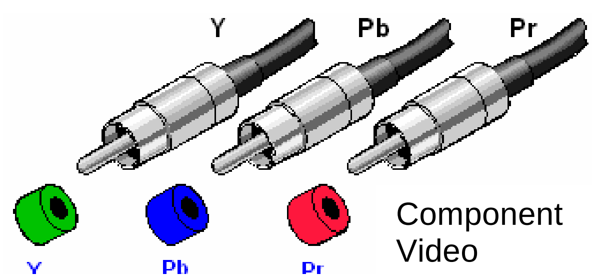
The matrix supports various AV video signal sources. Users can connect inputs and outputs to different audio/visual equipment such as: CD/DVD players, graphics workstations and number displays, projectors, video recorders, displays, multiplexers, and etc.

Audio/Video Ports

The RCA Jack used is a standardized audio/video connector. It uses coaxial signal connections in the center conductor and the outer ring for grounding. It will transmit digital audio signals and video signals.

Video I/O (3-RCA) Connectors

The Y/Pb/Pr connector is a high definition digital TV connector (color contour Y/Pb/Pr) capable of connecting with high definition digital set-top box, satellite receiver and various high definition monitors and TV equipment. There are separate connectors for the Y, Pb, and Pr signals.

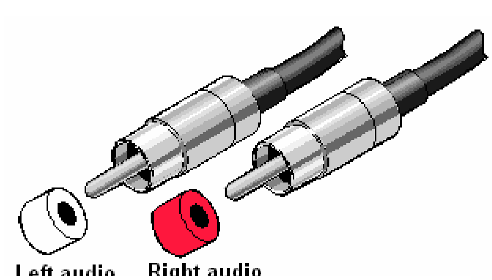


Component Video

YPbPr-RCA Connecting Cables

Audio I/O (2-RCA) Connectors

Connection of the RCA audio cables is as shown below: Normally RCA audio connectors are in pairs separately indicated by red for the right audio channel (R for right) and black or white for the left audio channel (L for left). The RCA stereo cable is in one set for both left and right audio channels with each channel in one cable.



Audio Connecting Cables

Connection Method

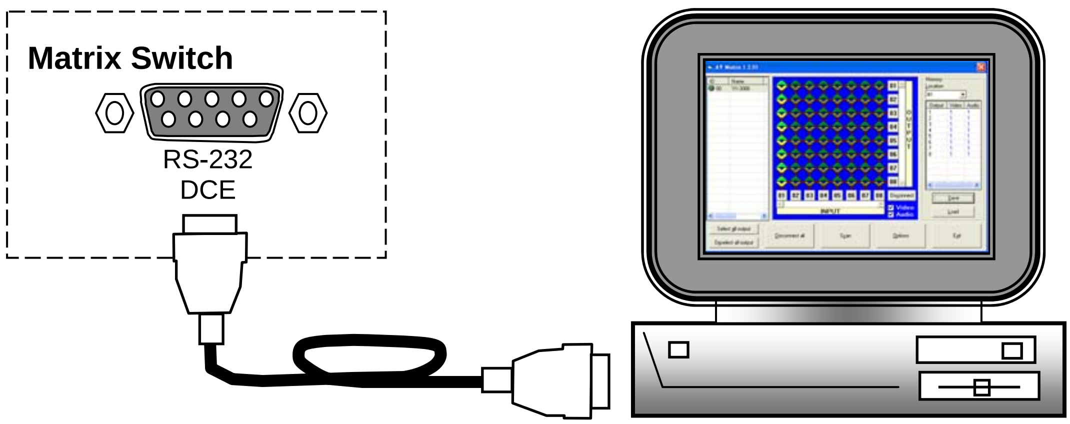
The audio inputs and outputs can be separately connected to audio signal connectors of video recorders and multiplexers.

Use the RCA cables for connecting AV equipment to the matrix. Connect the video and audio connectors of the signal source equipment output terminals to the same channel connector of the matrix input terminals. Connect the output of the matrix switch to the input connectors of the interfaced equipment.

NOTE: The colors at both ends of the various signal cables must correspond to each other, otherwise loss of color reproduction or even no signal output could occur.

Control Computer Connection

Use the RS-232 cable (supplied) to connect the computer serial port to the RS-232 communication port of the matrix host. The computer can then be used to control the matrix after installation of application software.



Matrix and Computer Connection

Remote Control Methods and Settings

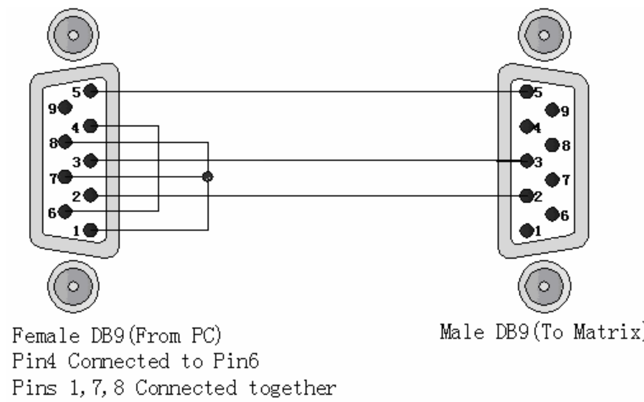
The matrix provides standard RS-232 and RS-485 serial communication ports. The matrix switching operation may be controlled locally using the front panel keys or remotely through the RS-232 or RS-485 serial communication.

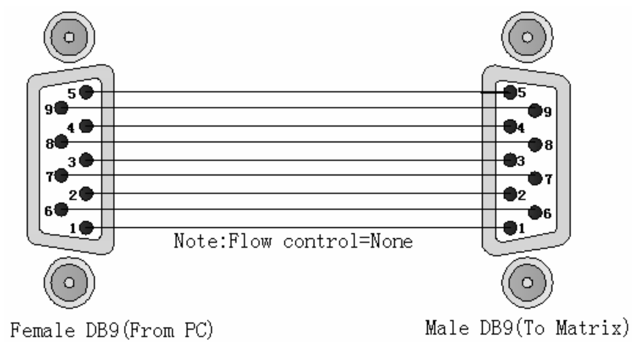
RS-232 Communication Port Connection Methods

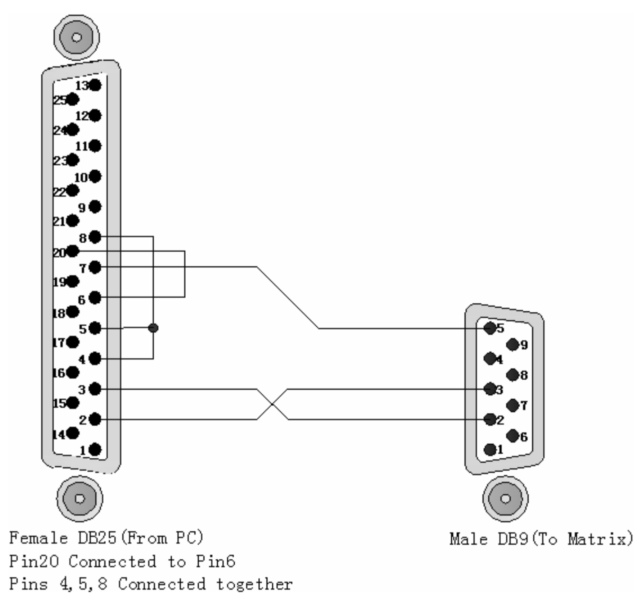
The RS-232 port is a 9-pin female connector. The pin functions are shown in the following table and connections in the Illustrations below:

Note: The Matrix RS-232 port is defined as DCE.

Pin number	Leg	Description
1	N/u	Null
2	Tx	Send
3	Rx	Receive
4	N/u	Null
5	Gnd	Ground
6	N/u	Null
7	N/u	Null
8	N/u	Null
9	N/u	Null

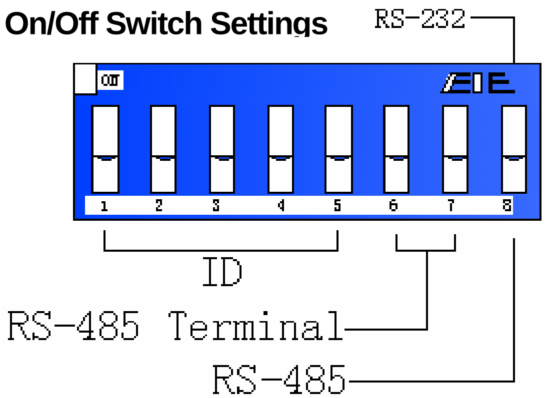


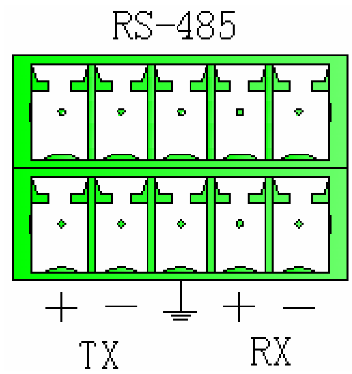




RS-485 Communication Port Connection Methods

The RS-485 port will control more than one product. The RS-485 Port is shown below.





A. DIP switch 8:(RS-232/RS-485 on/off)
   - ON:RS-232 enables single system or RS-485 serial master
   - OFF:RS-485 enables RS-485 serial slave B.

B. DIP switches 6 and 7 (RS-485 - terminator on/off)
   - ON enables Terminator
   - OFF disables Terminator

C. DIP switches 1 to 5 (ID address setting)

The ID address determines the position of a matrix within a system. When multiple Matrix units are connected to one PC or when the Matrix units are serially connected, the ID address decides which Matrix is controlled. The chart below describes the ID addresses.

ID Address Settings

ID Address (Decimal)	Software ID Address (Hexadecimal)	ON/OFF (Binary)	ON/OFF Switch Settings				
			SW1	SW2	SW3	SW4	SW5
0	00	00000	off	off	off	off	off
1	01	00001	off	off	off	off	on
2	02	00010	off	off	off	on	off
3	03	00011	off	off	off	on	on
4	04	00100	off	off	on	off	off
5	05	00101	off	off	on	off	on
6	06	00110	off	off	on	on	off
7	07	00111	off	off	on	on	on
8	08	01000	off	on	off	off	off

ID Address Settings

ID Address (Decimal)	Software ID Address (Hexadecimal)	ON/OFF (Binary)	ON/OFF Switch Settings				
			SW1	SW2	SW3	SW4	SW5
9	09	01001	off	on	off	off	on
10	0A	01010	off	on	off	on	off
11	0B	01011	off	on	off	on	on
12	0C	01100	off	on	on	off	off
13	0D	01101	off	on	on	off	on
14	0E	01110	off	on	on	on	off
15	0F	01111	off	on	on	on	on
16	10	10000	on	off	off	off	off
17	11	10001	on	off	off	off	on
18	12	10010	on	off	off	on	off
19	13	10011	on	off	off	on	on
20	14	10100	on	off	on	off	off
21	15	10101	on	off	on	off	on
22	16	10110	on	off	on	on	off
23	17	10111	on	off	on	on	on
24	18	11000	on	on	off	off	off
25	19	11001	on	on	off	off	on
26	1A	11010	on	on	off	on	off
27	1B	11011	on	on	off	on	on
28	1C	11100	on	on	on	off	off
29	1D	11101	on	on	on	off	on
30	1E	11110	on	on	on	on	off
31	1F	11111	on	on	on	on	on

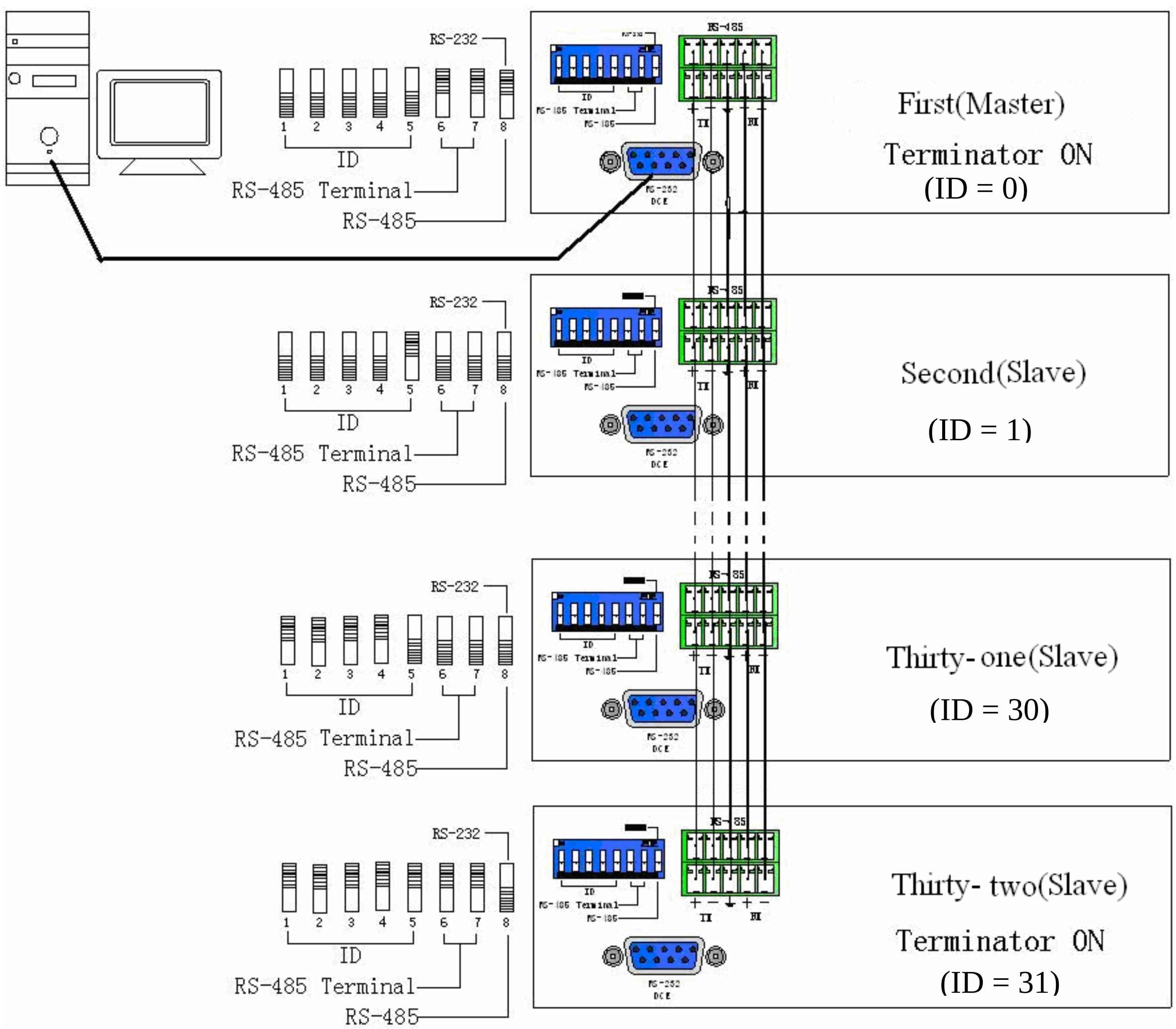
Matrix System and Control System Connection - RS-232

PC RS-232, multi-Matrix (up to 32) connections are as shown below.

NOTES:

1. For RS-232 connections refer to photo below.
2. RS-232 or RS-485 baud rates: 9600bps, 8-bit data transmission address, no, odd, or even parity, 1-bit stop address: (9600 - 8 - N - 1).
3. Serial connection between Matrix RS-485 as follows:

   TX (+) ↔ TX (+)
   TX (-) ↔ TX (-)
   RX (+) ↔ RX (+)
   RX (-) ↔ RX (-)
4. DIP switch 1-5 addresses must not set to same ID address.

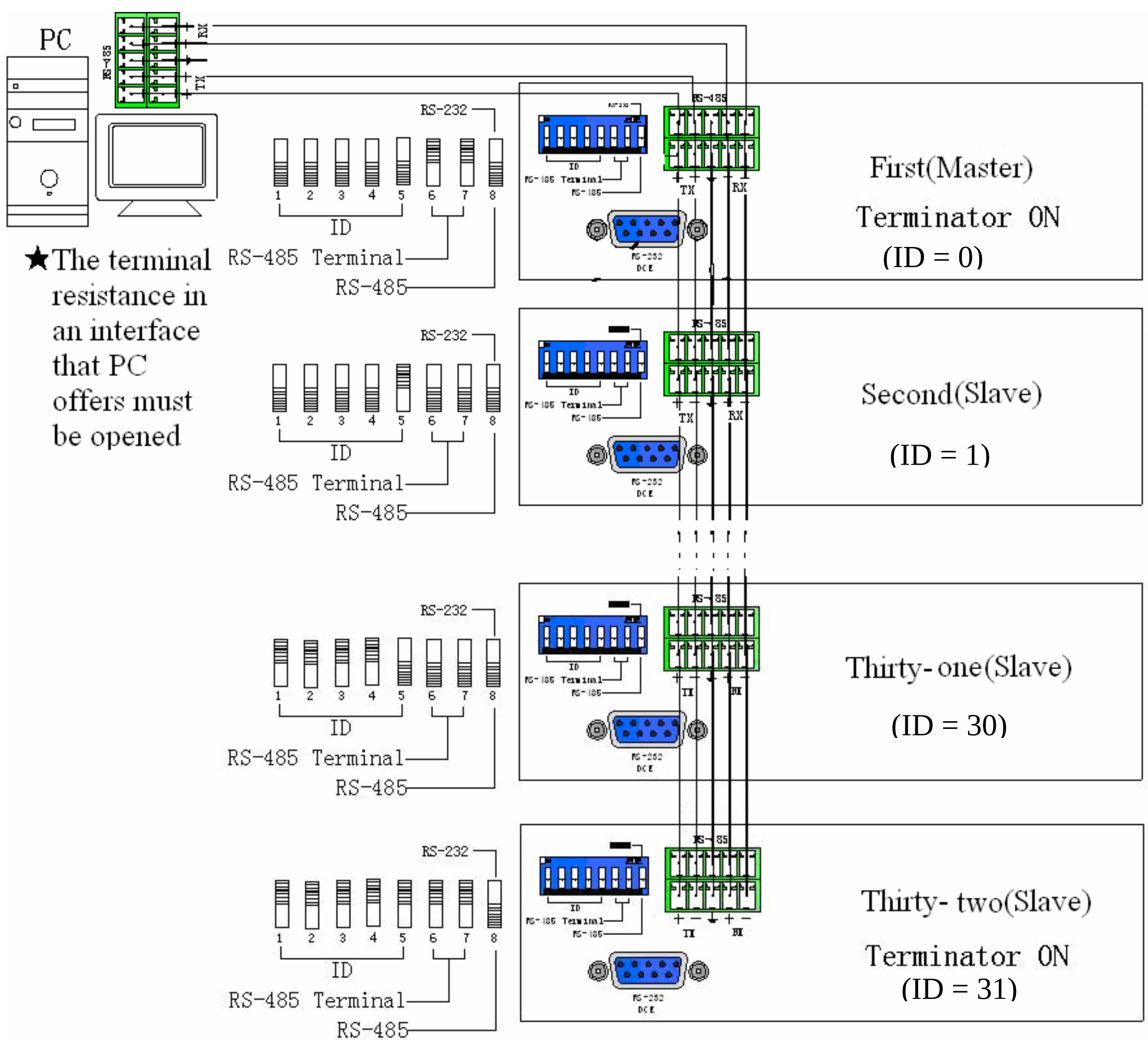


Matrix System and Control System Connection - RS-485

PC RS-485, multi-Matrix (up to 32) connections are as shown below.

NOTES:

1. RS-485 baud rate: 9600bps, 8-bit data transmission address, no, odd, or even parity 1-bit stop address: (9600 – 8 - N - 1).
2. Connect PC RS-485 port to the Matrix RS-485 port ➔: TX (+) ↔ TX (+)
TX (-) ↔ TX (-)
RX (+) ↔ RX (+)
RX (-) ↔ RX (-)
3. Serial connection between Matrix RS-485 ports ➔ TX (+) ↔ TX (+)
TX (-) ↔ TX (-)
RX (+) ↔ RX (+)
RX (-) ↔ RX (-)
4. DIP switch 1-5 addresses must not set to same ID address.



Matrix Control Panel Operation

Input/Output Switching Key Operation Mode

The front panel keys of the Matrix system are used for fast audio/video switching (for details refer to the **Front Panel Key Functions**).

Operation

Operation consists of three basic steps:

- Choose the Switching Method
- Select the Output Channel
- Select the Input Channel.

Switching Methods

Two primary switching methods are used, either Synchronous audio/video switching or separate switching.: Use the front panel **Audio** and **Video** keys to select Audio/Video Switching, Audio Switching Only, or Video Switching Only. An indicator shows if the function is selected.

Output Channel

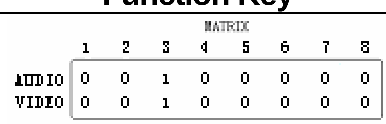
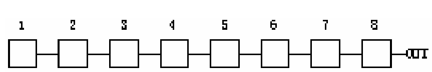
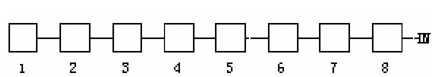
OUT Row 1-8 keys on the front panel represent connection of output channels 1 to 8 to peripheral equipment.

Input Channel

IN Row 1-8 keys on the front panel represent input channels 1 to 8 for connection of the signal source to be switched to the selected output channel.

Front Panel Key Functions

Front Panel Key Functions

Part	Function Key	Function
1		LCD display shows current matrix connection status and operation.
2		Output channel selection keys used for selecting audio/video output channels or for selection of Status Retrieve or Stored Number.
3		Input channel selection keys used for selecting audio/video input channels or for selection of Status Retrieve or Stored Number.

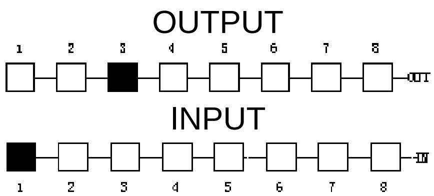
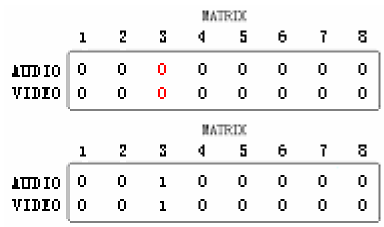
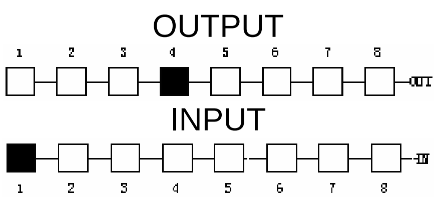
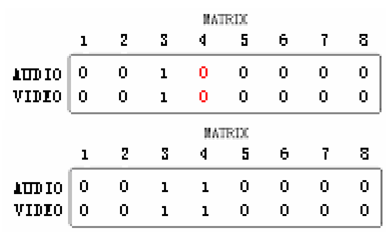
Front Panel Key Functions

Part	Function Key	Function
4	ALL	Implement all output selection keys via certain input route. **Example:** First press the **ALL** key, then select the input channel to output to all output channels; first press the **ALL** key, then press the **OFF** key to close all the presently displayed switching status.
5	OFF	Close output channel key. **Example:** First press the output channel button to close, then press the **OFF** key to close the specified channel.
6	STO (Store Key)	Saves all current input/output corresponding relations. **Example:** Press the **STO** key, then press the desired output channel key to save all currently displayed input/output corresponding relations.
7	RCL (Retrieve Key)	The **RCL** key retrieves the saved input/output corresponding relations. **Example:** First press the **RCL** key, then press the previously saved output channel key to retrieve the saved input/output status and implement this status switching.
8	AUDIO	Enables or disables audio switching selections. **Example:** Press the Audio key to open or close the Audio switching function. When the LED indicator next to the Audio key is on it indicates audio switching is enabled, when off the function is disabled.
9	VIDEO	Enables or disables video switching selections. **Example 1**: Press the Video key to open or close the video switching function. When the LED indicator next to the Video key is on it indicates video switching is enabled, when off the function is disabled.

Operation Examples

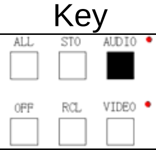
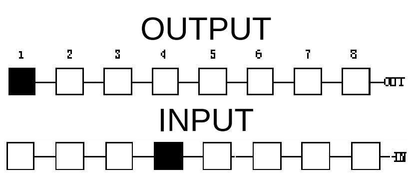
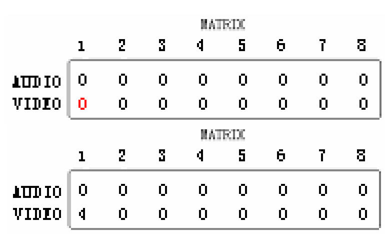
Example 1: Synchronously connect the number 1 audio/video input signals to the number 3 and 4 output channels (Audio and Video enabled).

Operation Example 1

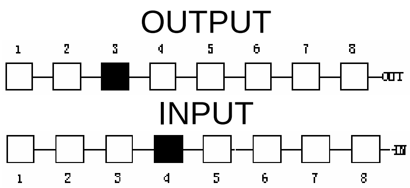
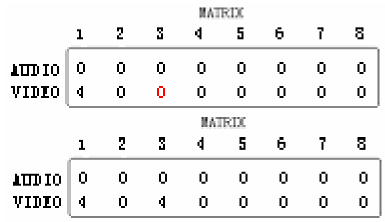
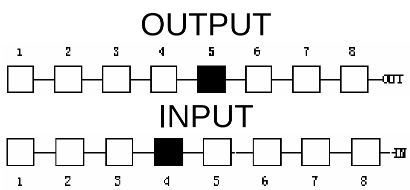
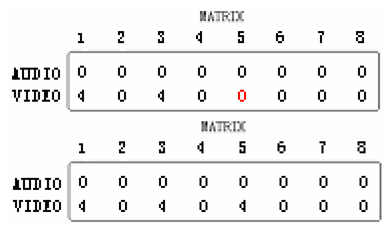
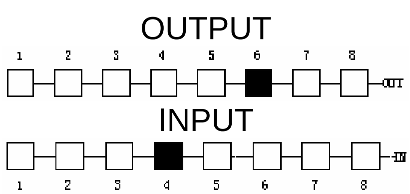
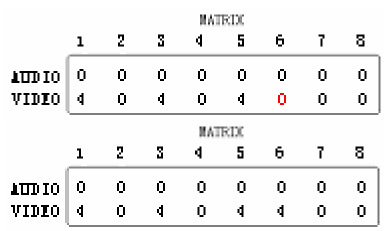
Key	LCD Display	Operation
		1. Press the **OUT** number 3 key (output channel). 2. When the LCD number(s) under the 3 on the panel begins to flash press the **IN** number 1 key The LCD shows 1 at channel number 3 for both Audio and Video.
		3. Press the **OUT** number 4 key (output channel), 4. When the LCD number(s) under the 4 on the panel begins to flash press the **IN** number 1 key The LCD shows 1 at channel number 4 for both Audio and Video.

Example 2: Connect number4 video input signals from channel to number 1, 3, 5 and 6 output channels (Audio disabled and Video enabled).

Operation Example 2

Key	LCD Display	Operation
		1. Press the AUDIO key to turn off the LED indicator.
		2. Press the **OUT** number 1 key (output channel). 3. When the Video LCD number under the 1 on the panel begins to flash press the **IN** number 4 key The LCD shows 4 at channel number 1 for video only.

Operation Example 2

Key	LCD Display	Operation
		4. Press the **OUT** number 3 key (output channel). 5. When the Video LCD number under the 3 on the panel begins to flash press the **IN** number 4 key The LCD shows 4 at channel number 3 for video only.
		6. Press the **OUT** number 5 key (output channel). 7. When the Video LCD number under the 5 on the panel begins to flash press the **IN** number 4 key The LCD shows 4 at channel number 5 for video only.
		8. Press the **OUT** number 6 key (output channel). 9. When the Video LCD number under the 6 on the panel begins to flash press the **IN** number 4 key The LCD shows 4 at channel number 6 for video only.

Matrix Application Software

Software Introduction

The (AV Matrix) Matrix control software is used to remotely configure one or more of the SW404HD or SW808HD matrix switches.

Software Description

The AV Matrix testing software application tool is used for matrix testing and application. The following is the required PC operation environment.

- Window98/2000/NT/XP operating systems
- 32M or greater internal memory
- 10M or greater hard disk space
- CD-ROM
- At least one serial communication port.

Software Activation

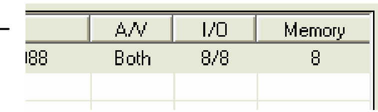
1. Turn off power both to the matrix and to the computer.
2. Connect the matrix RS-232 port to the PC RS-232 port using the bundled communication cable. (Refer to Matrix and Control Computer Connection).
3. Turn on power to the matrix and the computer.
4. Insert the CD ROM provided and install **AV Matrix.msi**.
5. Click on the AV Matrix program under the start menu.
6. Click on the **Scan** button to connect to the matrix switch.

Software Features

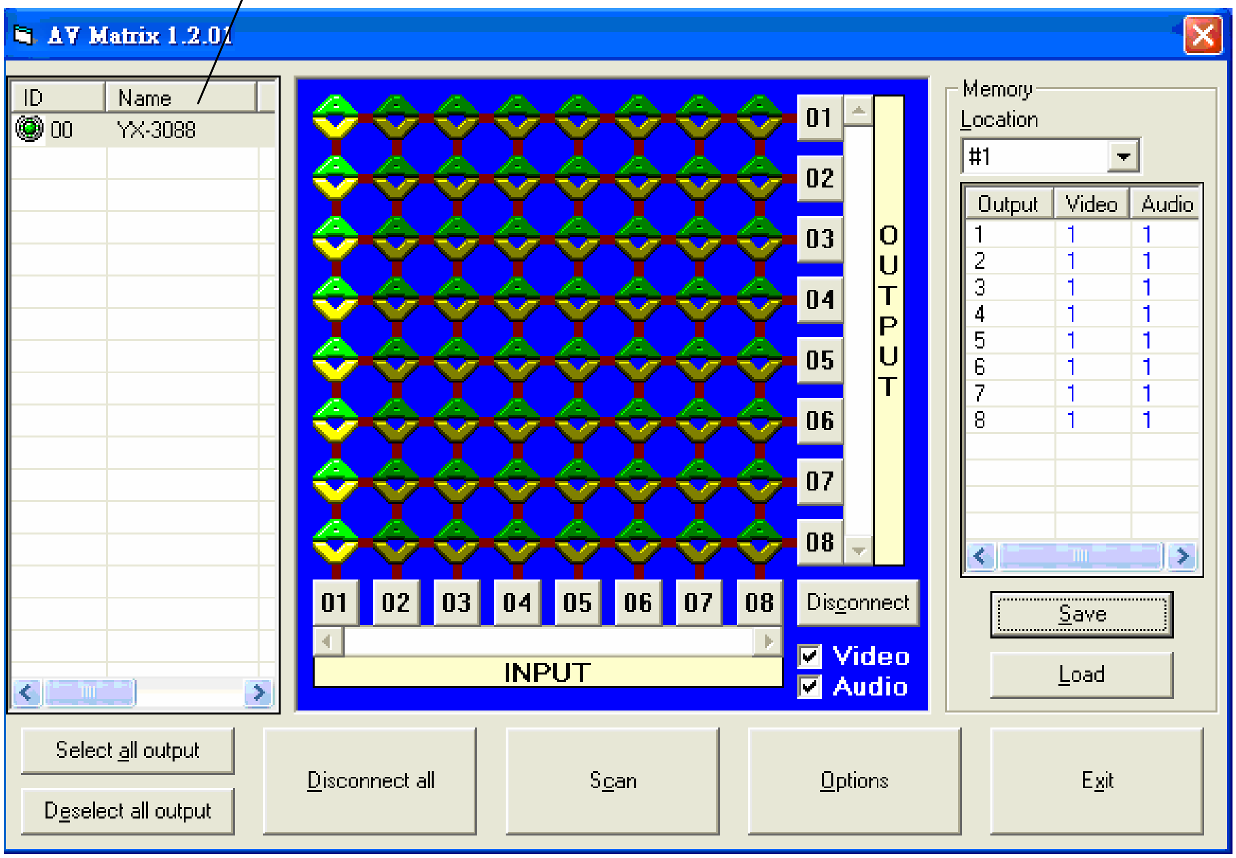
The software controls signal connection between the corresponding input port and output port as required. The main operation window is shown below:

Main Operation Interface Functions

Refer to the window menu (next page). The blue interface area shows the cross connect matrix of output ports 01-08 and input ports 01-08. On the lower right hand corner, select either **Video** for signal input switching or **Disconnect all** to close all output ports. Click to check the white box to the left of **Video** or **Audio** for video or audio signal transmission.

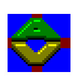


Use the lower scroll bar to view additional columns



Examples for Selecting Matrix Switching Functions:

Example 1 (Audio and Video Switching): Using a SW808HD matrix having all the input/output ports properly connected to the equipment. There are two methods to set channel 1 audio/video to channels 2, 3 and 5 as output and channel 3 audio/video to channel *6* for output:

First method: In the lower right corner of the blue area, enable the **Video** and **Audio** functions (check the white boxes). To complete the switching operation, directly click on the corresponding  icons on the matrix to turn them into .

Second method:.

The following 3 steps sets the switching operation of Audio/Video input channel 1 to output channels 2, 3 and 5 while at the same time switch Audio/Video input channel 3 to output channel 6.

Step 1: In the lower right corner of the blue area, enable the **Video** and **Audio** functions (check the white boxes),

Step 2: First select the Output number keys 02, 03 and 05 to the right, and select the Input number key 01 to the bottom.

Then, consecutively press the previously selected Output number keys 02, 03 and 05 (or press the Deselect all output key). This selects Input 01 to be routed to Outputs 02, 03, and 05.

Step 3: First select the Output number key 06 to the right, and select the Input number key 03 to the bottom.

Then, press the previously selected Output number key 06 (or press the Deselect all output key). This selects Input 03 to be routed to Output 06.

Example 2 (Video Only Switching):: Using a SW808HD matrix having all the input/output ports properly connected to the equipment. To set the input/output connectors to switching from video channel 1 to output channels number 1, 6 and 7 and also to switch from audio channel 2 to output channel 8. There are two ways of operations:

First method: In the lower right corner of the blue area, enable the **Video** and disable the **Audio** functions (check/uncheck the white boxes). To complete the switching operation, click on the corresponding  icons corresponding directly to the INPUT number key 01 and the OUTPUT number keys 01, 06, and 07 on the matrix to turn them into .

Second method:

The following 4 steps, completes the operation of switching video channel 1 to output channels 1, 6, and 7 while also switching audio channel 2 to output channel 8.

Step 1: In the lower right corner of the blue area, enable the **Video** and disable the **Audio** functions (check/uncheck the white boxes).

Step 2: Select the output number keys 01,06 and 07 to the right and select the input number key 01 to the bottom.

Then, press the previously pressed output number keys 01, 06, and 07 to the right (or press the Deselect all output key). This selects video switching of input 01 to output 01,06 and 07.

Step 3: In the lower right corner of the blue area, disable the **Video** and enable the **Audio** functions (uncheck/check the white boxes).

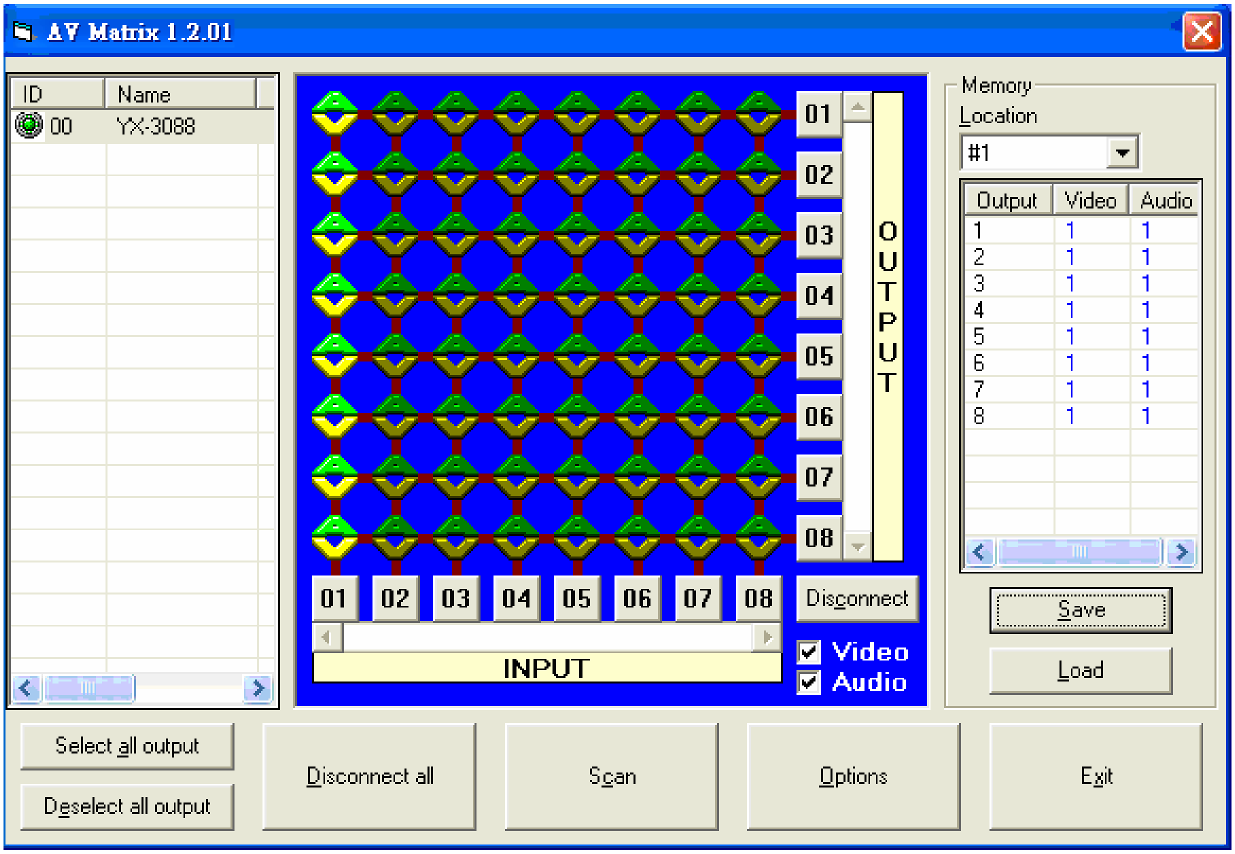
Step 4: Select output number key 08 to the right and input number key 02 to the bottom. Then, press again the previously pressed output number key to the right (or press the Deselect all output key). This selects audio switching of input 02 to output 08.

Disconnect Function Keys

Close all the unused output ports.

A specific example of operation is described below:

The default input and output relations are shown below:

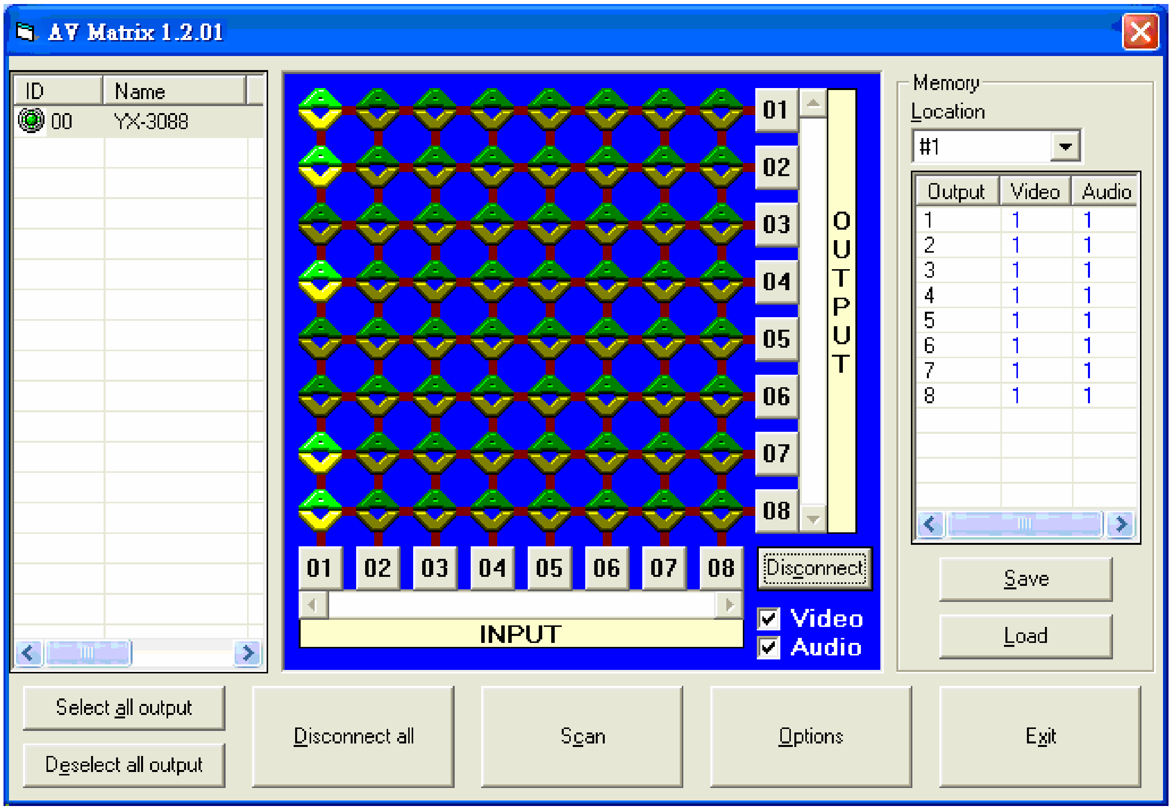


Example: Close the output ports 03, 05, and 06.

Step 1: First press down the output number keys 03, 05 and 06 to the right

Step 2: Press the **Disconnect** key

Step 3: Press the previously pressed output number keys 03, 05 and 06 (or press the **Deselect all output** key) to complete the operation. The final results will be as shown below:

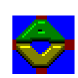


Select all output / Deselect all output: Switching Functions

(1) **Select all output** function is used to select one port for input and all output ports for output.

A specific example of operation is described below:

Example: Using a SW808HD matrix with all input and output ports properly connected to the equipment. The needed input/output ports should be set to audio/video channel 1 while switching all output ports to output.

Make sure to select both **Video** and **Audio** by checking the boxes in the lower right corner of the blue box. Then, press the **Select all output** key and select the input number key 01. Click on the matrix icons along the 01 row  to turn them into  to complete the command operation.

. (2) **DeSelect all output** function is used to close the **Select all output** functions.

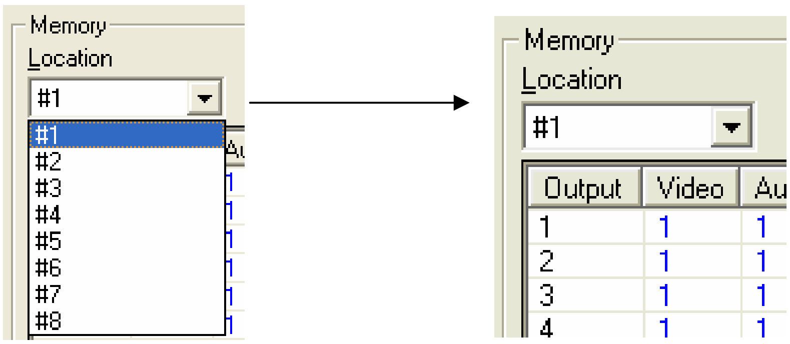
Disconnect all: Command Function Description

Use this command to close all the switching paths at one time. Press the **Disconnect all** key to close connection to all input and output ports.

Memory Function Usage

Store and Retrieve Function Description

The Store Function saves all the present input/output switching relations to any Locations from #1 to #8 desired. The Retrieve Function is used to retrieve these saved input/output switching relations.



Store Function Example of the

Store all the present input/output switching relations to Location #1;

1. Select Location #1 ' as shown in the figure above,
2. Click the **Save** key to save all the present input/output switching relations to Location #1.

Retrieve Function Example

To retrieve the input/output corresponding relations saved in Location #1;

1. Select Location #1 as shown in the figure below
2. Click the Load key to retrieve all the input/output corresponding relations stored in Location #1.

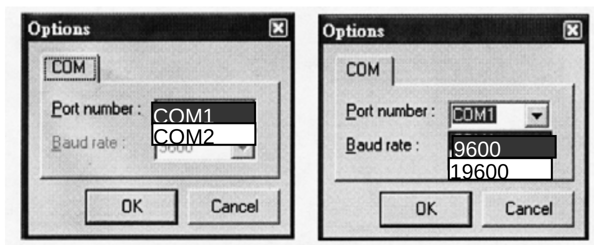
Scan Function Usage

Use the mouse to click the Scan key to refresh the AV Matrix operating interface.

Options Function Usage

This is an Activation Function for connecting a PC to a Matrix set.

1. In the main menu, select **Options** to pop up the Options window.
2. In Port Number field, select either COM1 port or COM2 port.
3. In BAUD Rate select 9600 for signal transmission
4. Select OK to finish.

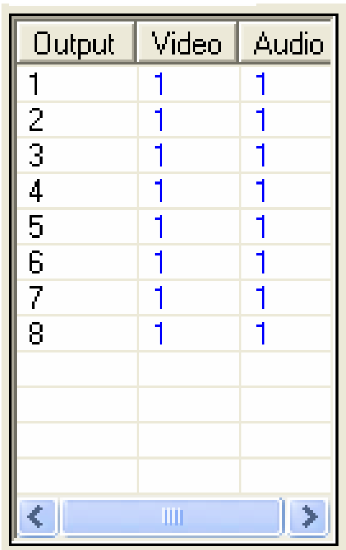


Exit Function Description

Used to exit the operating software.

Other Usages

Displays the presently saved switching status as shown below:



Output	Video	Audio
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1

This table shows the Video/Audio Input ports corresponding to the Output ports. When a port is closed, ZERO will be shown in that box.

Communication Protocol and Control Command Code

Communication Protocol:

- Baud rate 9600bps
- No, odd, or even parity
- 8-bit transmission address
- 1 bit stop address.

Refer to the "Command list.pdf" on the CD-ROM for the command system.

Matrix System Technical Parameters

Parameters	**Model**	
	SW808HD	**SW404HD**
Video		
Enhancement	0-dB	
Bandwidth	1 50MHz (-3dB), Full Load	
Max. Transmission Delay	20nS (±1nS)	
Switching Speed	50nS (Longest Time)	
Signal Type	Component/Composite Video	
Video Input		
Connector	8 RCA Female Connectors	4 RCA Female Connectors
Signal Strength	1 Vp-p Y Component Video, S-video, Composite Video; 0.3Vp-p R-Y & B-Y Component Video, S-video	
Min./Max. Voltage	Modulated Signal 0.5V~2.0Vp-p	

Parameters	Model	
	SW808HD	SW404HD
Impedance	75 ohms	
Video Output		
Connector	8 RCA Female Connectors	4 RCA Female Connectors
Signal Strength	2.5Vp-p	
Impedance	75 ohms	
Audio Signal		
Input/Output Connectors	RCA Female Connectors	
Signal Type	Stereo, Balanced or Unbalanced	
Impedance	Input: l0k-ohms Output: 100-ohms	
Max. Input Level	+19.5dBu	
Max. Output Level	+19.5dBu	
Control Type		
Serial Control Connectors	RS-232, 9-Pin Female D Type Connector	
Baud Rate and Protocol	9600bps, no odd or even parity, 8-bit Transmission Address , 1-bit Stop Address	
Serial Control Port Structure	TX, RX, GND	
Control Procedures	(AV Matrix))	
Specifications		
Power	100VAC~240VAC, 50/60Hz, International Auto-Switch	
Temperature	Storage, Operating Temp: -40°C~+85°C	
Humidity	Storage, Operating Humidity: 10%~90%	
Housing Measurements	485 mm (L) X 272 mm (W) X 140mm (H)	
Product Weight	4800g	
Median Failure Interval	30,000 Hours	

Common Problems and Solutions

1. The matrix front panel switching keys not responsive?
   Answer: The matrix front panel keys employ scanning testing and require longer response time. Press the keys for 2 seconds and then release. This way, key switching will be responsive in operation.

2. The matrix does not display or color display is abnormal after hot plug?
   Answer: Switching of the signals goes through the matrix ICs. If the voltage difference between the input signal equipment and the matrix equipment is too large, hot plug could easily cause damage to the matrix switches. Turn off power to the system before plugging or unplugging.

3. Ghosting happens when YPbPr signals output to display?
   Answer: Ghosting is often caused either by the projector, inferior cable quality or long transmission distance. Adjust the projector or replace with better quality cable.

4. Loss of color reproduction happens or no video signal output?
   Answer: Check if connectors at both ends of the YPbPr signal cable are correctly connected.

5. The serial port fails to control the matrix?
   Answer: Check that the communication port set by the control software is correctly connected to the corresponding serial port of the equipment. Verify the serial control parameters (9600, 8, N, 1).

6. The corresponding graphics fail to output during matrix switching?
   Answer:
   (1) Check for a signal on the input end. If there is no input signal, it could be that the input connection cable is broken or the connector is loose. Repair or replace the connecting cable.
   (2) Check if there is signal on the output end. If there is no output signal, the cable could be broken or the connector is loose. Reseat or replace the connecting cable.
   (3) Check if the output port number is the same as the controlled port number.
   (4) If none of the above circumstances happen, it could be internal failure of the product itself. Call 469-429 9200 for technical support.

7. The power LED is not on, LCD has no display and no response in operation?
   Answer: Check if the equipment power input is good. Check the power at the AC outlet and that the power cord is firmly connected at both ends.

8. Power leakage sensed during plugging or unplugging of the audio/video ports?
   Answer: It could be that the equipment power is not properly grounded. Properly ground the equipment, otherwise product life may be shortened.

9. The LCD displays normally, the communication port shows good return codes, but displays no graphics or audio output?
   Answer: (1) It could be that the audio/video connectors are loose. Replace the connectors.
   (2) It could be the connection cable short-circuited. Replace the cable.
   (3) It could be the connection cable is broken. Replace the cable.

10. The matrix panel keys and communication ports are out of order?
    Answer: Check if the equipment power input is good and the computer communication ports are good. If the connections are good, it could be failure of the product. Call 469-429 9200 for technical support.

11. Operation and function failure occurred?
    Answer: Check if the equipment and the matrix system are properly connected. If the problem persists, Call 469-429 9200 for technical support.

APPENDIX – Matrix Switch Communication Protocol

The RS-232/RS-485 communications are half-duplex with variable byte count packets. For RS-232, the matrix switch operates as a DCE device and therefore can be connected using a straight cable to a DTE device such as a computer. The RS-232 connector is a DB-9 female. For RS-485, a discrete wiring connector is provided for custom connection to any RS-485 equipment. For full details on connecting to the matrix switch refer to the User Manual.

Default Communication Settings – 9600, N, 8, 1

Baud Rate	9600
Parity	None
Data Bits	8
Stop Bits	1

DIP Switch Description

SW1-SW5: Machine ID (address)

0=ON, 1=OFF

SW1	SW2	SW3	SW4	SW5	Notes
0	0	0	0	0	Address for RS-232/RS-485 Master only
0 ~ 1	0 ~ 1	0 ~ 1	0 ~ 1	1 ~ 1	Addresses for Slave devices

SW6-SW7: RS-485 TX/RX Terminating Resistor

0=ON, 1=OFF

SW6	SW7	Notes
0	0	Resistor ON
1	1	Resistor OFF
1	0	Invalid
0	1	Invalid

SW8: RS-232/RS-485 Master or RS-485 Slave

0=ON, 1=OFF

SW8	Notes
0	RS-485 Slave Device
1	RS-232/RS-485 Master

Protocol Description

Command Packet

Command packets are sent to the Matrix Switch from a computer and are 4 or more bytes long depending upon the instruction code.

Command Type A

Address	Instruction Code	Output Byte	Input Byte	CRC

or Command Type B

Address	Instruction Code	Length Byte	Output Byte 1	Input Byte 1	= = =	Output Byte n	Input Byte n	CRC

Response Packet

Response or Acknowledgement (ACK) packets are returned from the Matrix Switch after receipt of a command packet. The response packets are 2 or more bytes long depending upon the command requirements.

ACK Type A

ACK Byte	CRC

<u>or</u> ACK Type B

ACK Byte	Length Byte	Output Byte 1	Input Byte 1	= = =	Output Byte n	Input Byte n	CRC

<u>or</u> ACK Type C

ACK Byte	Length Byte	Information Byte	Supported Output Ports	Supported Input Ports	Machine Name 1	= =	Machine Name n	CRC

Command Packet Byte Descriptions

Command Type A

Address	Instruction Code	Output Byte	Input Byte	CRC

Command Type B

Address	Instruction Code	Length Byte	Output Byte 1	Input Byte 1	Output Byte n	Input Byte n	CRC

Address Byte (Command Type A and B)

7	6	5	4	3	2	1	0
BT	X	CRC	M4	M3	M3	M1	M0
Broadcast	Reserved	CRC	Machine ID (5-bit address)				

BT: Broadcast 0: Instruction for one machine with matching Machine ID
1: Instruction for all machines

If BT = 1, machine will not return a response packet.
If BT = 0, machine must respond

CRC: CRC-8 0: Host (computer) does not append a CRC byte at end of command packet
1: Host appends a CRC byte to end of command packet

Instruction Code Byte (Command Type A and B)

7	6	5	4	3	2	1	0
VAR	X	I5	I4	I3	I2	I1	I0
Variable Length	Reserved	Instruction Code (6-bit command)					

VAR: Variable Length 0: The command packet is 4 bytes with Output and Input bytes
1: The command packet is variable length and contains a length byte indicating the number of Output and Input bytes

Length Byte (Command Type B only)

L7	L6	L5	L4	L3	L2	L1	L0
Number of Output and Input Bytes to follow not including CRC							

Output Byte (Command Type A and B)

O7	O6	O5	O4	O3	O2	O1	O0
Refer to Command Table							

Input Byte (Command Type A and B)

I7	I6	I5	I4	I3	I2	I1	I0
Refer to Command Table							

CRC (Command Type A and B)

C7	C6	C5	C4	C3	C2	C1	C0
CRC-8 calculated from all bytes in packet. Appended if CRC bit set in Instruction code							

Response Packet Byte Descriptions

ACK Type A

ACK Byte	CRC

ACK Byte (ACK Type A, B, and C)

7	6	5	4	3	2	1	0
ACC	X	X	M4	M3	M3	Ml	MO
Accept	Reserved	Reserved	Machine ID (5-bit address)				

ACC: Accept: 0: Reject received command
1: Accept command

ACK Type B

ACK Byte	Length Byte	Output Byte 1	Input Byte 1	Output Byte n	= = =	Input Byte n	CRC

Length Byte (ACK Type B)

L7	L6	L5	L4	L3	L2	L1	L0
Number of Output and Input Bytes to follow not including CRC							

Output Byte (ACK Type B)

O7	O6	O5	O4	O3	O2	O1	O0
Refer to Command Table							

Input Byte *(*ACK Type B*)*

I7	I6	I5	I4	I3	I2	I1	I0
Refer to Command Table							

ACK Type C

ACK Byte	Length Byte	Information Byte	Supported Output Ports	Supported Input Ports	Machine Name 1	= =	Machine Name n	CRC

Length Byte (ACK Type C)

L7	L6	L5	L4	L3	L2	L1	L0
Count of Information Input Bytes to follow not including CRC							

Information Byte (ACK Type C)

7	6	5	4	3	2	1	0
AS	VS	X	X	TM4	TM3	TM1	TM0
Audio Support	Video Support	Reserved	Reserved	Total Memory Locations Available			

AS: Audio Support 0: Audio command not supported
1: Audio command supported

VS: Video Support 0: Video command not supported
1: Video command supported

Supported Output Port (ACK Type C)

SOP7	SOP6	SOP5	SOP4	SOP3	SOP2	SOP1	SOP0
Bit = 1 if output port is supported, else 0							

Supported Input Port (ACK Type C)

SIP7	SIP6	SIP5	SIP4	SIP3	SIP2	SIP1	SIP0
Bit = 1 if output port is supported, else 0							

Machine Name Bytes (ACK Type C)

MN7	MN6	MN5	MN4	MN3	MN2	MN1	MN0
ASCII Code (character)							

Command Table

HEX Instruction Code	Instruction Description	Variable Length	Output Byte	Input Byte	Note	ACK Type
00h	Dummy Call	N	00h	00h	1	A
01h	Switch Video	Y	Video output to switch 1 –8 (0=all)	Video input to switch 1 – 8 (0= disconnect)		B
02h	Switch Audio	Y	Video output to be switch 1 –8 (0=all)	Video input to be switch 1 – 8 (0= disconnect)		B
03h	Store All Video Status	N	00h	Memory Location # to store status, (not 0)	2	A
04h	Store All Audio Status	N	00h	Memory Location # to store status, (not 0)	2	A
05h	Recall All Video Status	N	00h	Memory Location # to recall status from, (not 0)	2	A
06h	Recall All Audio Status	N	00h	Memory Location # to recall status from, (not 0)	2	A
07h	Request Status of Video Output	Y	Video output for requested status, (1-8, 0= all)	Memory Location # to get status from	1,2	B

HEX Instruction Code	Instruction Description	Variable Length	Output Byte	Input Byte	Note	ACK Type
08h	Request Status of Audio Output	Y	Audi output for requested status, (1-8,0= all)	Memory Location # to get status from	1,2	B
3Fh	Request Machine Info and Model	N	00h	00h	1	C

Command Note:

1. Not supported for Broadcast command.
2. Memory # 0 is current switching status, memory # 1-x is free location. Refer to Information Byte for number of total memory locations.

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